

**Work Order ID 72004**

Friday, July 15, 2011 10:49:33 AM

Page 1

Item ID: D350-748-201

Accept

Revision ID:

Item Name: Crosstube Installation, High Aft

Start Date: 7/15/2011 Start Qty: 1.00

Required Date: 8/5/2011 Req'd Qty: 1.00

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: 11-07-15 Tooling: \_\_\_\_\_ Date: \_\_\_\_\_  
QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Run Start

Stop

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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Draw Nbr	Revision Nbr
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D350-748-241

F

100

0.00



DOCUMENT CONTROL

DC

Memo

0.00

Document Control

Photocopy bluefile &amp; type labels per PPPD350-748-201 CHG002

110

0.00



BENDING MACHINE - CROSSTUBES

CNC Bend 2

Memo

0.00

CNC Alpha 160 Bender

Bend tube as per Dwg D350-748-241 using CNC bender program D350A and Folio FT \_\_\_\_\_

120

0.00



QC15- Crosstube Dimensional Check

QC

Memo

0.00

Quality Control

Sub 30

11-10-31 (1)  
J. J. M. 11-10-25

11-8-30

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
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**NOTE:** Date & initial all entries

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Item ID:	D350-748-201	Accept		Setup	Start	
Revision ID:					Stop	
Item Name:	Crosstube Installation, High Aft					
Start Date:	7/15/2011	Start Qty:	1.00		Cust Item ID:	
Required Date:	8/5/2011	Req'd Qty:	1.00		Customer:	
Reference:						
Approvals:	Process Plan:	Date:	Tooling:	Date:	Run	Start
	QC:	Date:	SPC (Y/N):	Date:		Stop

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
125 	HandFXtube	0.00							
	Hand Finishing Crosstubes	0.00	SAD	11-08-30					
	<b>Memo</b> ***Stress relief*** Heat treat crosstube as per QSI010 4.3 Temp: <u>375</u> Start time: <u>4h30</u> Finish time: <u>8h30</u>								
127 	QC	0.00							
	Quality Control	0.00	Sulog131						
						(41)			

W/O:		WORK ORDER CHANGES					
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QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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130

0.00



Crosstubes



Crosstubes

Memo

0.00

Crosstubes

1-Drill Tube as per Dwg D350-748-241 Using DT8876 Drill Jigs,  
Set-up drill table as per QSI 010

2-Deburr

3-Engrave Part # and Batch # as per Dwg D350-748-241

4-Remove all marks from tube within limits of D350-748-241

5- Apply a light coat of LPS3 on the interior of tube

Batch: M1091736

SAD 11-08-31  
SAD 11-09-07

140

QC6-Inspect dimensions to drawing

0.00



QC

Memo

0.00

Quality Control

Sulorlot



W/O:		WORK ORDER CHANGES					
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150 Outsource process-Cadplate per QSI017 4.1.9.1 0.00



Outsource3

Memo

0.00

Outsource process - Cad plate

Issue P/O: 19834  
Stress relief at 375° for 5 hours  
Magnetic Particle Inspect per ASTM E1444  
Cadium Plate per AMS-QQ-P-416B, Class 1, Type 2  
Embrittle relief at 375° for 8 hours, Chromate Treat  
Possible Supplier: Southwest United Industries  
Ensure Certificate of Conformity is attached

CL 11/09/06 ①

160 Receive &amp; Inspect for Damage &amp; Mat'l Certs 0.00



Packaging

Memo

0.00

Packaging

Ensure certificate of conformity is attached

★ SEE W/O CHG ATTACHED

Per 11/9/11 ①  
Per 11/10/14 ①  
P70

170 QC5- Inspect part completeness to step on W/O 0.00



QC

Memo

0.00

Quality Control

m/ 11 10 17 ①

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
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W/O: 12004

## WORK ORDER CHANGES

DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
11.10.13	161	LOAD TUBE TO 3000 <sup>lb</sup> FOR 1 MINUTE REF D.S. EMAIL	JP	11.10.14	1	11.10.14 PSI 042	11/10/14
11.10.13	162	NOT TUBE PO 15157	JP	11-10-14	1		11/10/14

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## Chris Provencal

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**From:** David Shepherd <dshepherd@dartaero.com>  
**Sent:** Tuesday, April 27, 2010 3:40 PM  
**To:** 'Mike Petsche'  
**Cc:** 'Bill Beckett'; 'L Lacelle'; 'Chris Provencal'; 'Dan Stow'; ssheldon@dartaero.com  
**Subject:** 350 crosstubes

Mike,

I discussed the 350 crosstube load testing with Bill a little while ago and this plan makes sense to him.

So, my recommendation to clear these crosstubes is to load the fwd crosstubes to 3500 lb and the aft crosstubes to 3000 lb in the deflection test rig and document on the work orders that this test has been completed. Hold max load for 1 minute. Per TP-D350-748-2, these loads represent the maximum load on these crosstubes at gross weight and are below the yield point of the material. I would like to request that Chris Provencal witness these tests and sign off the work orders based on his experience with Dart landing gears. My feeling is that if there is a problem with the parts, it will manifest itself during this load test. I, for one, would feel a lot more confident in testing each crosstube in this manner than relying totally on what Exova has to say. I think it would be very difficult to reach a conclusion on the whole batch on the basis of cracks in two parts from the batch.

I believe that we can accomplish this before next Friday, which also gives us time to hear what Exova has to say in case it has an impact on our decision. So far, what I have seen from Exova shows me that there are fluctuations in the heat treating but the tubes are heat treated to our specification.

For this reason, I believe we should tell DHS that it looks like we will be able to start shipping 350 crosstubes by May 7th pending a successful Engineering test of the material.

David.

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Revision ID:

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Cust Item ID:

Required Date: 8/5/2011 Req'd Qty: 1.00



Customer:

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Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
180		0.00							
	SprayPaint								
SprayPaint	Memo	0.00							
Spray Painting	1-Prime inside crosstube as per QSI 005 4.2 2-Paint Outside of Tube as per Dart QSI 005 4.2								
190		0.00							
	QC14- Inspect Spray Paint								
QC	Memo	0.00							
Quality Control	Then, Wrap in plastic bag to protect from scratches								
200		0.00							
	Crosstubes								
Crosstubes	Memo	0.00							
Crosstubes	1-Install Ground wire Insert, then insert screw and washer 2-Install Abrasion strips as per Dwg D350-748-241 & QSI 035. 3-Install supports Using Dt8876 as per Dwg D350-748-241, Torque to 60-80 IN-LBS								

11-10-20

11/10/21

11-10-24

W/O:		WORK ORDER CHANGES					
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Friday, July 15, 2011 10:49:34 AM



**Accept**

**Setup Start**

**Stop**



**Start Date:** 7/15/2011      **Start Qty:** 1.00

**Cust Item ID:**

**Required Date: 8/5/2011      Req'd Qty: 1.00**



**Customer:**

**Reference:**

Run Start



**Approvals:**      **Process Plan:** \_\_\_\_\_      **Date:** \_\_\_\_\_      **Tooling:** \_\_\_\_\_      **Date:** \_\_\_\_\_

**Stop**



QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

**Insp.  
Stamp**

0.00



QC

## Memo

0.00

## Quality Control

220

## Pick Kit

0.00



## Packaging

## Memo

0.00

## Packaging

230

QC4- 100% Inspect kits for completeness

0.00



QC

## Memo

0.00

## Quality Control

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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Cust Item ID:

Required Date: 8/5/2011 Req'd Qty: 1.00



Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start



QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

240

0.00



Packaging

Packaging

Memo

0.00

Packaging

Identify and pack for shipping as per PPPD350-748-201

Location: \_\_\_\_\_

PPP Rev: B

SP 11-11-04

250

0.00



QC21- Final Inspection - Work Order Release

QC

Memo

0.00

Quality Control

11/11/4

MF 11-11-04

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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# Picklist Print

Friday, July 15, 2011 10:49:48 AM

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Work Order ID: 72004

Parent Item: D350-748-201

Parent Item Name: Crosstube Installation, High Aft

Start Date: 7/15/2011

Required Date: 8/5/2011

Start Qty: 1.00

Required Qty: 1.00

## Comments:

IPP Rev: A New Issue 06-07-05 JLM  
 IPP Rev: B Update qty of MS21042L5 06-09-12 KJ  
 IPP Rev C Combined manufacturing 08.04.02 EC verified by: DD  
 IPP Rev:D 08-06-24 revD as per dwg DD verified by:EC  
 IPP Rev: E 08.12.11 Step17 was step 21 KJ Verified by:EC IPP Rev:F  
 10.08.04 added QSI010 4.3 DD verf:EC

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
---------------------------------	------------------------	---------------	-------------	---------------------	------------------	-----------------	--------------------	----------------	-------------	--------------	---------------	----------------	--------

D350-748-241TRN Manufactured No

110

Each

3.0000

1

1



Crosstube Turning Detail

### Location

LG

372331

### Loc Qty

3

### Loc Code

61314

0

61315

0

68834

1

68835

1

68836

1

① 11-8-30

ALS4-1032-225 Purchased No

200

Each

268.0000

1

1



Insert

118696



11-10-24

### Location

ST282

### Loc Qty

268

### Loc Code

110768

209

117717

59

AN960JD10 NAS1149D0363J Purchased No

200

Each

0.0000

1

1



Washer

118612



11-10-24

W/O:		WORK ORDER CHANGES					
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Start Date: 7/15/2011

Required Date: 8/5/2011

Start Qty: 1.00

Required Qty: 1.00

D2856-400

Manufactured No

200 f

82.7896

1.181

1.243158



Abraison Strip

71164



RT 11-10-24

Location

Loc Qty

Loc Code

ST403

82.12

68076

82.12

ST409

0.6696

63735

0.6696

1- cut as per dwg D2856

D3502-1

Manufactured No

200 Each

31.0000

2

2



Support



RT 11-10-24

Location

Loc Qty

Loc Code

ST063

31

~~61206~~

12

61843

9

64004

10

MS21920-20

Purchased No

200 Each

86.0000

2

2



Clamp (per MIL-DTL-8783C)

118649 x2



RT 11-10-24

Location

Loc Qty

Loc Code

LG050

86

116799

10

117279

30

117968

4

118236

42

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Shop Packet Print

Page 2

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Start Date: 7/15/2011

Required Date: 8/5/2011

Start Qty: 1.00

Required Qty: 1.00

MS27039-1-10

Purchased

No

200

Each

190.0000

1

1



Screw

118612



11-10-24

Location

Loc Qty

Loc Code

ST290

150

117441

150

ST291

40

115935

40

AN4-41A

Purchased

No

220

Each

273.0000

8



Bolt

Location

Loc Qty

Loc Code

ST360

273

115108

98

115705

50

116191

50

117619

50

117795

25

AN4-6A

Purchased

No

220

Each

906.0000

16

16



Bolt

Location

Loc Qty

Loc Code

ST356

706

116400

106

116924

400

117872

200

ST358

200

117514

200

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Start Qty: 1.00

Required Qty: 1.00

AN5-32A

Purchased

No

220

Each

198.0000

4

4



Bolt

Location

Loc Qty

Loc Code

ST340

198

117161

13

117514

50

117688

25

117872

60

118191

50

AN960JD416

NAS1149D0463J

Purchased

No

220

Each

0.0000

32

32



Washer

AN960JD516

NAS1149D0563J

Purchased

No

220

Each

0.0000

8

8



Washer

D3500-1

Manufactured

No

220

Each

44.0000

4

4



Saddle

Location

Loc Qty

Loc Code

ST424

9

66127

9

ST424/25

20

62207

20

ST425

15

61838

15

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Start Qty: 1.00

Required Qty: 1.00

D3501-1

Manufactured No

220

Each

369.0000

16



Bushing

Location

Loc Qty

Loc Code

ST063

269

61984

67

68939

102

70682

100

ST066

100

67757

100

16

24

MS21042L4

Purchased

No

220

Each

4,028.000

24



Nut

Location

Loc Qty

Loc Code

ST300

4028

117441

1781

117601

747

117885

1500

24

M1184518

MS21042L5

Purchased

No

220

Each

1,364.000

4



Nut

Location

Loc Qty

Loc Code

ST300

1364

116105

5

116548

175

117441

498

117591

100

117611

90

118179

496

4

M110268

Friday, July 15, 2011 10:49:49 AM

Shop Packet Print

Page 5

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

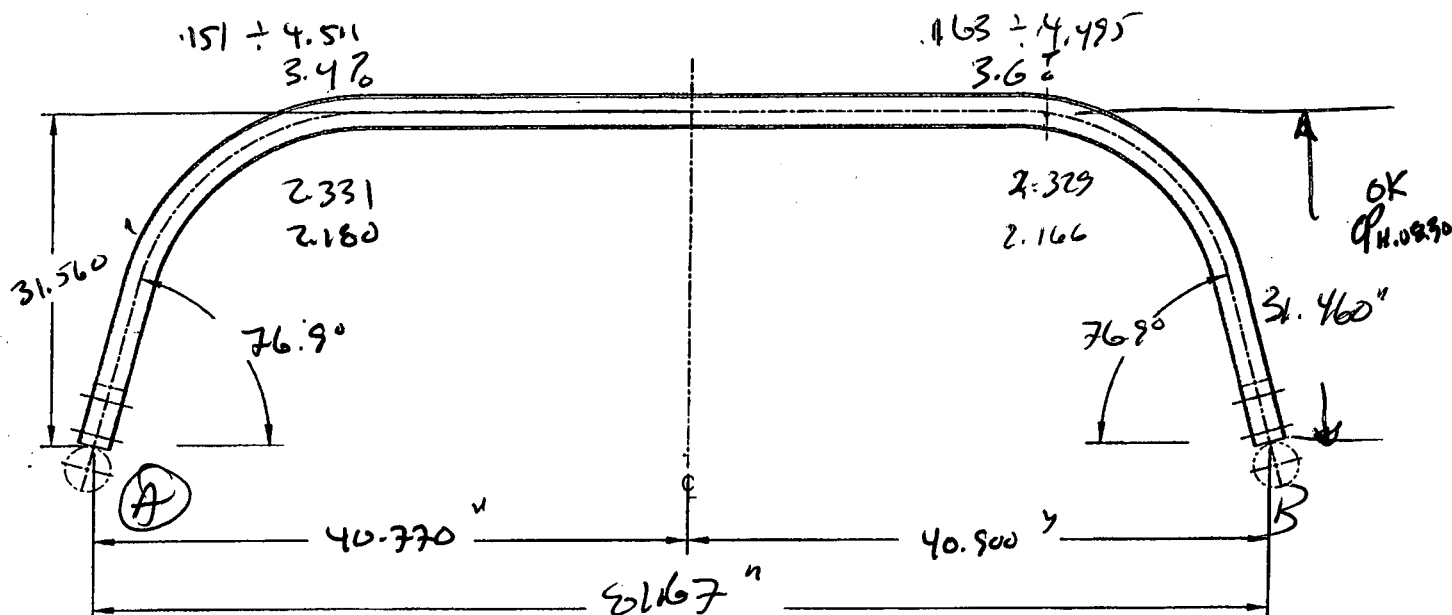
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NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

DART AEROSPACE LTD		Work Order:	72004 *
Description: Crosstube High Aft (AS350/355)		Part Number:	D350-748-201
Inspection Dwg: D350-748-241 Rev: E		Page 1 of 1	

Required Dimension	Min	Max
Height	31.22	31.48
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.54	82.06



Comments
twist $\approx 0.020$ "
Side A = $3.476$ crashy @ 7/10/06
Side B = $3.62$ crashy @ 7/10/06
One height is under tolerance. Acceptable PH.0830 QPS1042

QC15 Inspection	S
Date	11/08/30

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

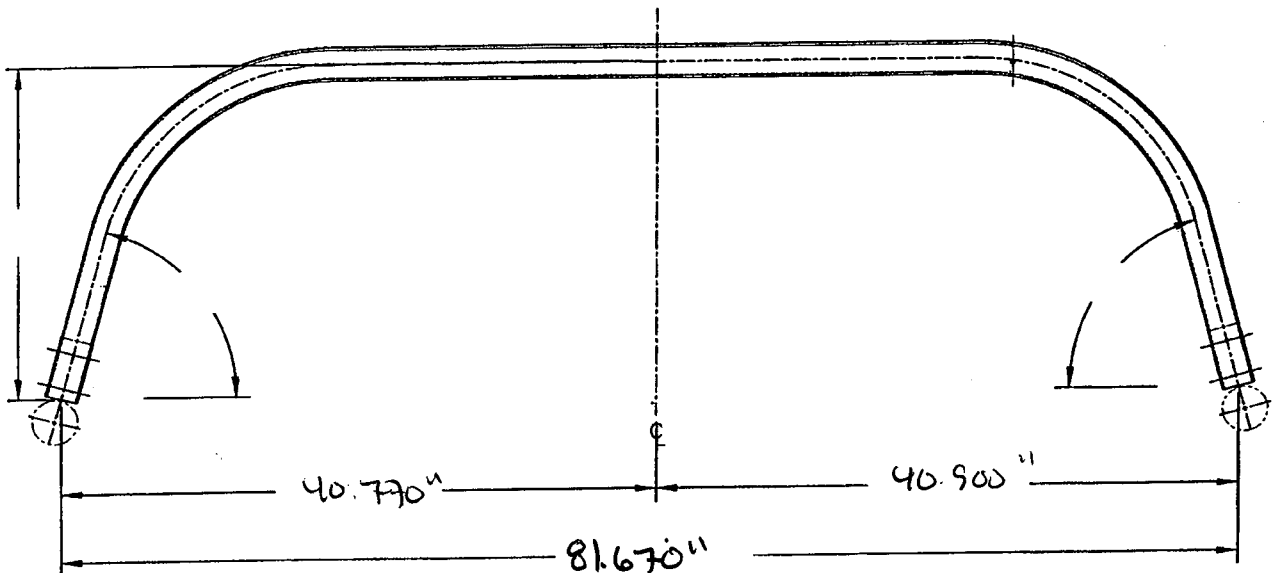
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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

DART AEROSPACE LTD		Work Order:	
Description: Crosstube High Aft (AS350/355)		Part Number:	D350-748-201
Inspection Dwg: D350-748-241 Rev: E		Page 1 of 1	

*For stress relief only*

Required Dimension	Min	Max
Height	31.22	31.48
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.54	82.06



Comments
<i>twist 20.014"</i>

QC15 Inspection	<i>S</i>
Date	<i>11/08/31</i>

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	<i>[Signature]</i>



Item	Qty -241	Part Number	Description
1	X	D350-748-241	CROSSTUBE ASSEMBLY (AS 350/355 HI AFT)
2	1	D6015-125	CROSSTUBE (OR D6018-125)
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

#### GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6015-125 OR D6018-125  
FINISHED LENGTH = 122.700±0.06
- 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2  
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: DART PART NUMBER "D350-748-241" AND BATCH NUMBER ON INSIDE OF CUFF  
PER DART QSI 044 6.4 (VIBRATING STYLUS)
- 7) WEIGHT: 29.85 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
- 9) RUN CUTTER OFF PART WHERE INDICATED. BLEND OUT ALL EDGES FROM MACHINING  
LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER  
BENDING.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO  
BENDING IS 6% BASED ON O.D.
- 11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING. ACCEPTABLE TO  
VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.
- 12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE,  
CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE  
OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES,  
NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY.  
CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE  
MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO  
CRACKING/CHIPPING/GROOVES.
- 14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT  
NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.
- 15) MAX TWIST AFTER BENDING: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN  
CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.25 (ZN C1-3).

SHOP COPY  
RETURN TO  
ENGINEERING  
UNCONTROLLED COPY  
SUBJECT TO AMENDMENT  
WITHOUT NOTICE  
WORK ORDER  
NO. 12004

*11-07-15*

RELEASED  
2011-07-08

F	ADD HRC TEST OPTION (B8-1) PER PAR 09-040, ADD TWIST LIMIT (A8-1, C1-3), ADD D6015-125 OPTION (C8-1), STOCK DIM NOW MACHINED (D1-4)	CP	10.11.23
E	REVISE GENERAL NOTES; UPDATE TO CURRENT STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A8-3); ADD TOLERANCES (ZN C6-3, D2-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6018-125 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31
REV.	DESCRIPTION	BY	DATE
DESIGN			
DRAWN			
CHECKED			
MFG. APPR.			
APPROVED			
DE APPR.			
DATE	10.11.23		

<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA	
DRAWING NO. D350-748-241	REV. F SHEET 1 OF 4
TITLE CROSSTUBE (AS 350/355 HI AFT)	SCALE NTS
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W/O:		WORK ORDER CHANGES					
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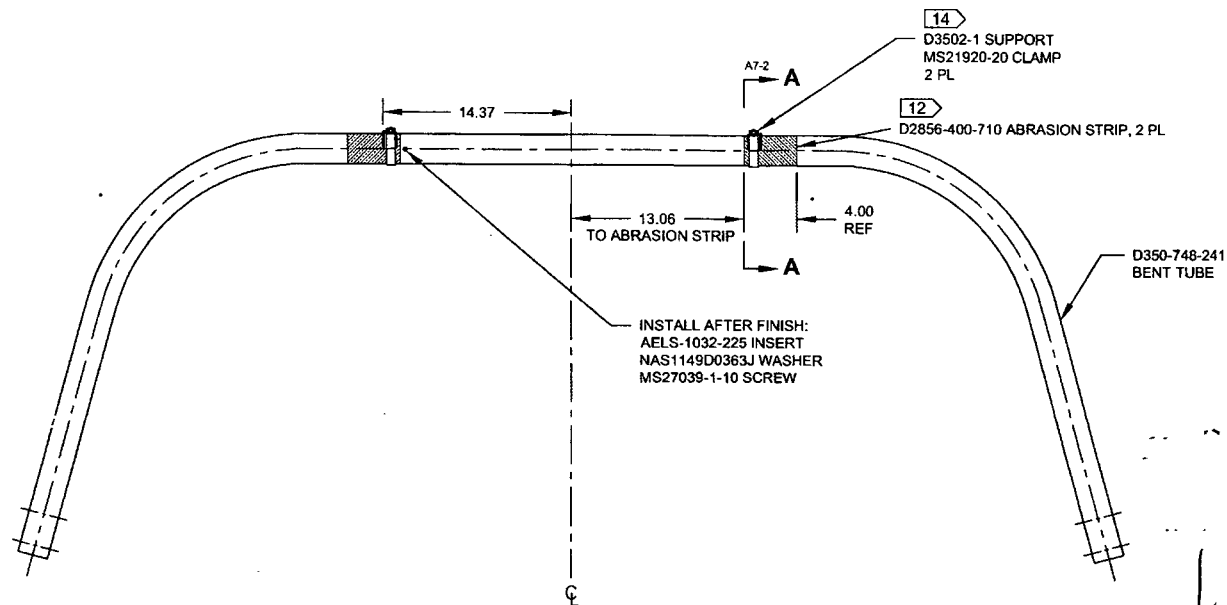
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Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

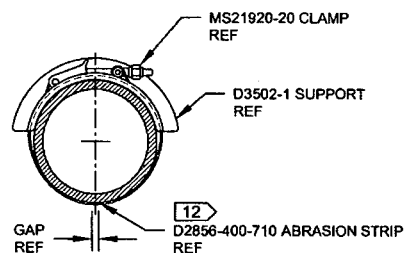
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DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries





**D350-748-241  
ASSEMBLY DETAIL**



**SECTION A-A** D4-2  
SCALE 4X

**RELEASED**  
2011-05-19  
JNH

DESIGN		<b>DART AEROSPACE LTD</b>	
DRAWN		HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO.	REV. F
MFG. APPR.		D350-748-241	SHEET 2 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE (AS 350/355 HI AFT)	NTS
DATE	10.11.23	<small>COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRELIMINARY AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.</small>	

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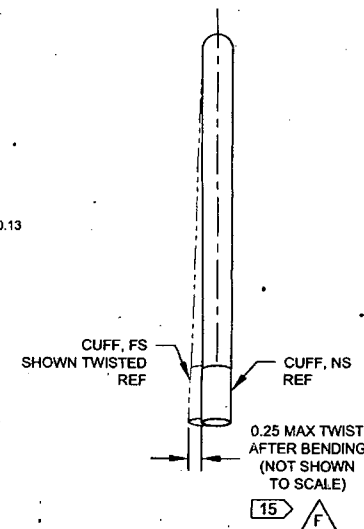
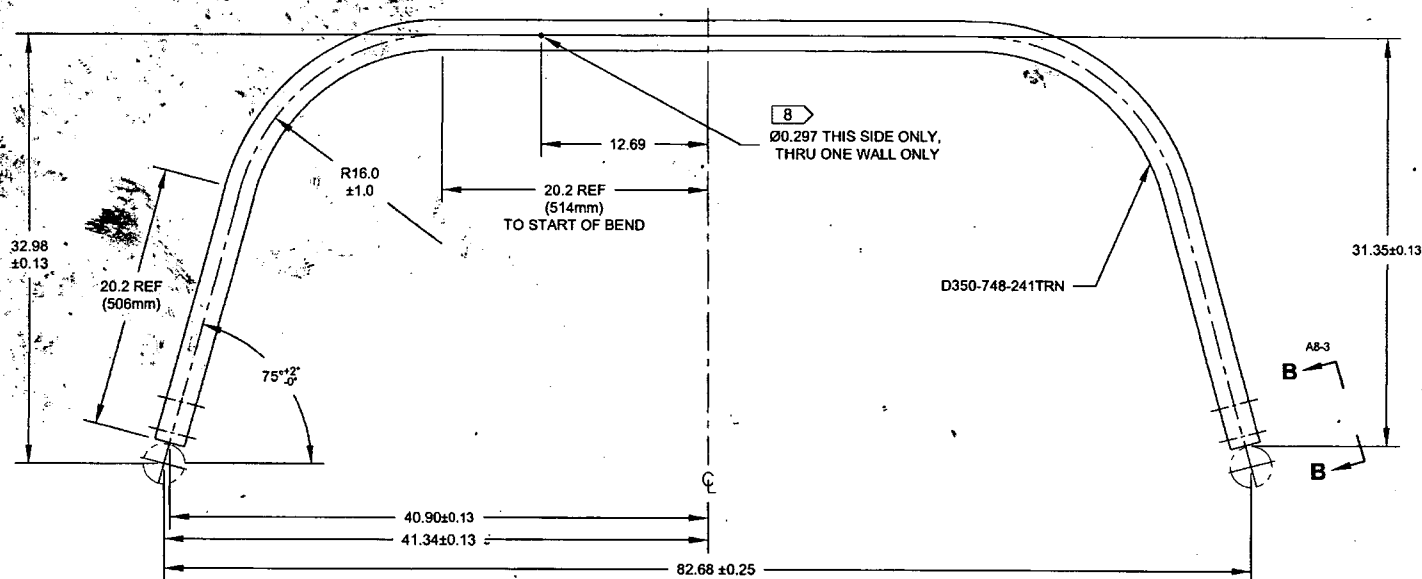
8 7 6 5 4 3 2 1

D

C

B

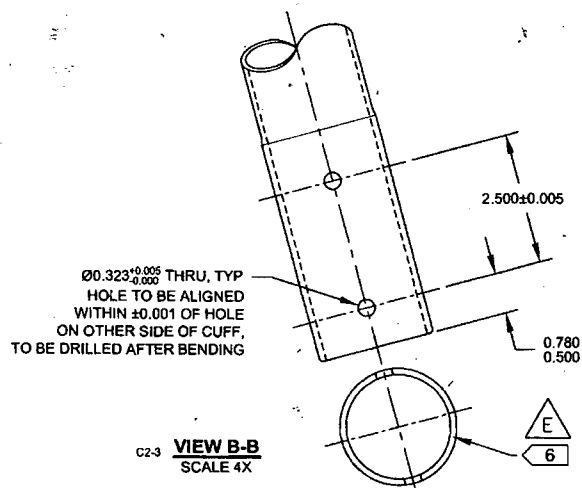
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**D350-748-241**  
**BENDING AND DRILLING DETAIL** 10

**RELEASED**  
2011-01-18

72004



C2-3 **VIEW B-B**  
SCALE 4X

DESIGN	qp	<b>DART AEROSPACE LTD</b>	
DRAWN	qp	HAWKESBURY, ONTARIO, CANADA	
CHECKED	h	DRAWING NO.	REV. F
MFG. APPR.	h	D350-748-241	SHEET 3 OF 4
APPROVED	h	TITLE	SCALE
DE APPR.	h	CROSSTUBE (AS 350/355 HI AFT)	NTS
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8 7 6 5 4 3 2 1

**Dart Aerospace Ltd**

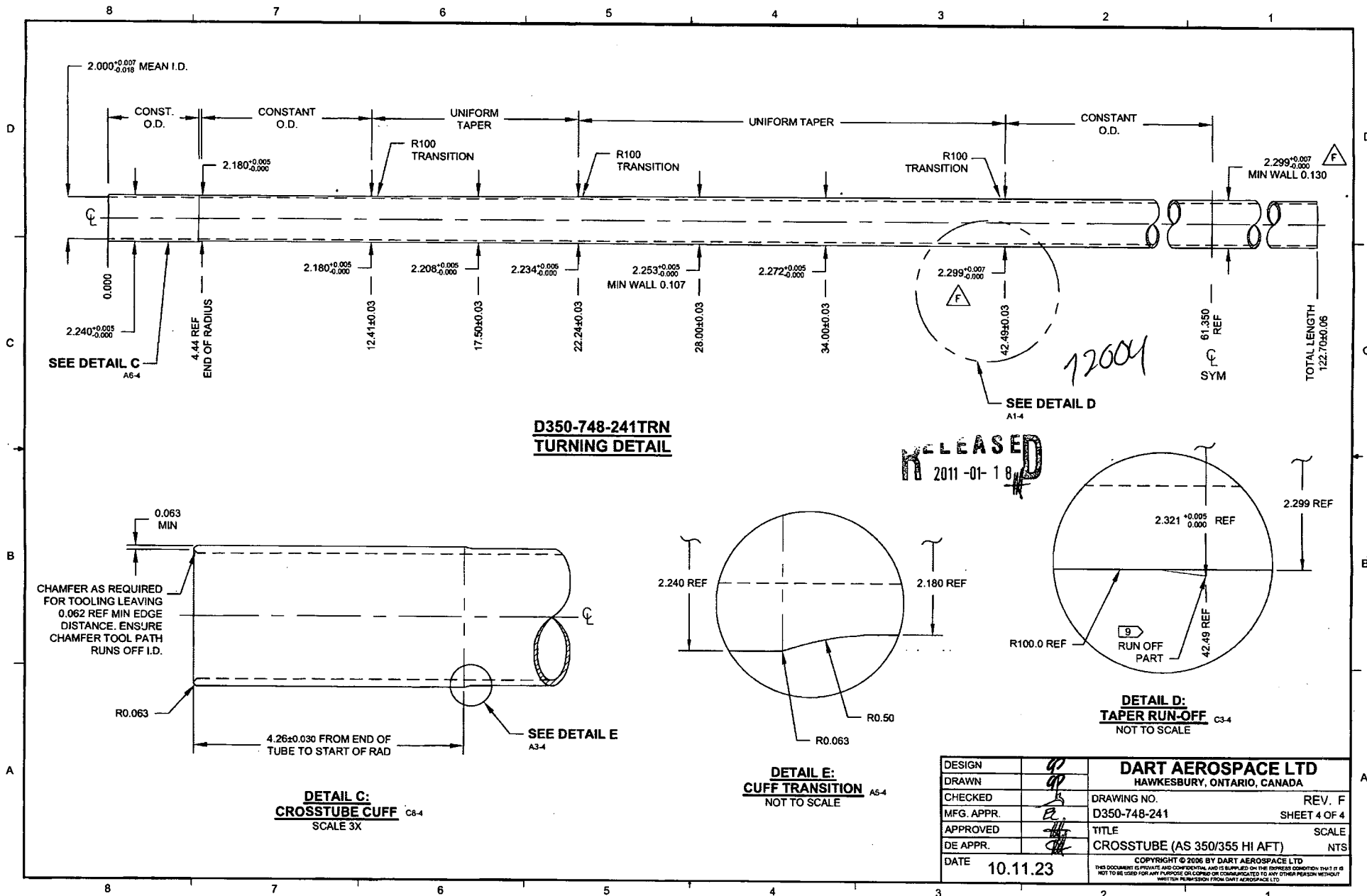
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# Dart Aerospace Ltd

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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

**CERTIFICATE OF  
CONFORMANCE**

**CADORATH PLATING CO. LTD.  
2150 LOGAN AVENUE  
WINNIPEG, MANITOBA R2J-0J1**

**DATE:** Sep-30-2011

**CONSIGNED TO:** Dart Aerospace Ltd.  
1270 Aberdeen St.  
Hawksbury, ON K6A 1K7

**W/O #:** 107802  
**INVOICE #:** 56968

**CONTRACT OR  
PURCHASE ORDER #** 14834

**DESCRIPTION:** SKID

**QTY** 1

**P/N #** D350-748-201

**S/N #** B72004

STRESS RELIEF BAKE HEAT CHART # 11-1001. MPI IAW ASTM -E-  
1444. CADMIUM PLATE IAW AMS-QQ-P-416 C TYPE 2 YELLOW  
CLASS 1. BAKE HEAT CHART # 11-1027.

**CERTIFICATE:** I certify that the items indicated here on have  
been inspected and tested and conform to all specifications  
and requirements detailed on the contract or purchase order.

**Approved Inspector:**



A large, stylized handwritten signature in black ink, written over a horizontal line.



## LIQUID PENETRANT TEST REPORT

P- 05635

CLIENT DART AEROSPACE DATE OCT-14-2011 PAGE 1 OF 1  
ATTENTION LINDA / CHANTALE / IAN / MARK ACUREN JOB NO. \_\_\_\_\_ TIME AM ☒ PM ☐  
ADDRESS 1270 ABERDEEN ST. POWO No. 14834  
HAWKESBURY ON WORK LOCATION \_\_\_\_\_  
PROJECT PT-2 WET FLUORESCENT LIQUID PENETRANT ON "CROSSTUBES" ACCEPTANCE STD. \_\_\_\_\_ REV./DATE \_\_\_\_\_  
ITEM(S) EXAMINED - SEE BELOW

JOB DESCRIPTION \_\_\_\_\_ PROCEDURE NO. LT 002 REV./DATE 2007 TECHNIQUE NO. LT 002 REV./DATE 2007  
PART NO. \_\_\_\_\_ MATERIAL STEEL THICKNESS N/A  
SCOPE PERFORMED A WET FLUORESCENT LIQUID PENETRANT INSPECTION ON 100% OF THE EXTERNAL SURFACE ON THE ITEMS MENTIONED BELOW

TEST DETAILS  
METHOD ☒ FLUORESCENT ☐ VISIBLE ☐ WATER WASH ☐ SOLVENT REMOVABLE ☐ POST EMULSIFIED  
FAMILY BRAND MAGNA FLUX BLACK LIGHT S/N 13798 OUTPUT > 1000  $\mu$ W/cm<sup>2</sup> ☐ AMBIENT < 2 fc  
PENETRANT 2L-67 MINIMUM DWELL TIME 10 MIN. LIGHTING EQUIP. ☐ FLASHLIGHT ☐ TROUBLELIGHT ☐ OUTPUT > 100 fc @ SURFACE  
PENETRANT REMOVER 420 MINIMUM DRY TIME > 10 MIN. OTHER \_\_\_\_\_  
DEVELOPER SKD-52 MINIMUM DWELL TIME 10 MIN. LIGHT METER S/N \_\_\_\_\_ CAL DUE DATE Aug 2012  
DEVELOPER TYPE ☒ NON AQUEOUS ☐ AQUEOUS ☐ DRY

TEST SURFACE  
SURFACE CONDITION ☐ AS GROUND ☐ AS WELDED ☐ MACHINED ☐ SHOT-BLASTED ☒ CLEAN BARE METAL  
SURFACE TEMPERATURE ☐ < - 4°C / 20°F ☐ - 4°C / 20°F TO 10°C / 50°F ☒ 10°C / 50°F TO 52°C / 125°F ☐ > 52°C / 125°F

RESULTS- ( ☐ METRIC ☐ IMPERIAL )

1 CROSS TUBE W.O. ID 68549 ✓  
2 68550 ✓  
3 68551 ✓  
4 68553 ✓  
5 72004 ✓  
6 72005 ✓  
7 73364 ✓

ITEM ID D350-748-201 HIGH AFT  
D350-748-201 HIGH AFT  
D350-748-201 HIGH AFT  
D350-748-201 HIGH AFT  
D350-748-201 HIGH AFT  
D350-748-201 HIGH AFT  
D350-748-201 HIGH AFT

NO RELEVANT INDICATION WAS DETECTED  
AS PER APPLICABLE STANDARDS.

11.10.17

## Scope of Services

The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

## Standard of Care

In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.

## SIGNATURES

CLIENT REPRESENTATIVE

TECHNICIAN (SIGNATURE):

NAME (PRINT):

Ian Titley

JVES DESROSIERS

1<sup>st</sup> TECHNICIAN

CGSB LEVEL 2 SNT LEVEL

CGSB REG. No. 3049

SIGNATURE

2<sup>nd</sup> TECHNICIAN

CGSB LEVEL SNT LEVEL

CGSB REG. No.

DTR # E44763

REPORT  
REVIEWED BY:

NAME

INITIALS